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Contents

M1114 Motorized Turret Kit provides power to humvees

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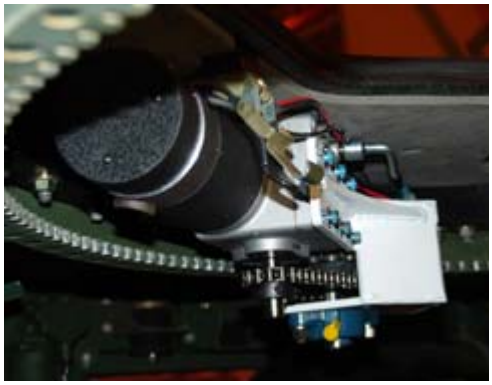

The M1114 Motorized Turret (Courtesy Photo)

Imagine a Soldier from Detroit who stepped into the motor pool and out of the hot Iraq sun. He walked over to his M1114 Up-Armored humvee. Even with a few dents and cracks, he would never give up the vehicle that has saved his life and that of the rest of his crew more than once. He saw a box on the hood of each vehicle in the motor pool. BPMTU it said on the side. He cut open the box on his hood and pulled out the packing list. After reading it, a smile came over his face. He pulled over a toolbox and went to work.

The convoy pulled out of the green zone and headed over to be part of the security for the parliamentary candidates. The group of three M1114 Humvees, including the Soldier's, was taking up the rearmost position. Slewing their newly installed Battery Powered Motorized Turret Units (BPMTU), they were able to scan different directions for maximum situational awareness. Following a major intersection, a group of three cars pulled out and started to follow the convoy. When the Soldier slewed around to check the rear, he saw all three cars had one driver each and they were all talking on cell phones – all the cars seemed to be riding low, a sure sign of heavy explosives. The Soldier radioed the other two escorts to alert them of the danger. They instantly swung their turrets to the rear position and each took up aim on the possible attackers.

Knowing that most civilians would instantly back off when weapons are pointed at them, he was almost positive this was going to get deadly real soon. Then, one of the cars zoomed into the oncoming lane and tried to pass the Up-Armored vehicles to get closer to their real prey, the electoral candidates, the Soldier slewed his turret around and kept his gun on target as it tried to pass. He fired a small burst into the front left tire of the car and it instantly swerved away from the convoy and hit a parked car and exploded. The other two cars saw the futility of this operation and decided to turn tail and run. The Soldier's two wingmen took up the chase in two different directions.

The Humvee's powered turret easily kept up the pressure on the fleeing cars by peppering the car's tires. The second driver decided to blow himself up, peppering the Gunner's Protection Kit with metal fragments. The third driver decided to give up following the futile chase with a car that wouldn't drive any further.

While the previous paragraphs are fictional, the newly designed kit to motorize the M1114 turret is the real deal. The following paragraphs tell the rest of the story.

Noticing the need for a motorized turret kit ring located on the M1114 up-armored Humvee, engineers at the U.S. Tank Automotive Research, Development and Engineering Center, designed the Battery Powered Motorized Traversing Unit (BPMTU) which provides a gunner with powered cupola operations. The BPMTU provides motorized power to the cupola for rotation and also allows for BPMTU motor disengagement to enable the gunner to manually rotate the cupola.

The cupola consists of the BPMTU, the gunner's shield, the GPK, and the M2 .50 caliber HB Machine Gun or the Mk19 Grenade Machine Gun. The cupola in the Humvee is similar to a turret, except the gunner sits in a sling seat during mobility operations and stands on an adjustable platform during combat operations. The cupola provides 360-degree field of view for the gunner.

In order to lessen the strain on the soldier from the weight of the Humvee cupola, the BPMTU was developed to assist the gunner in slewing the cupola by providing motorized power. The BPMTU consists of a user interface system with a magnetic base, a system control assembly, an emergency stop switch, a break-away connector, and a motor and drive assembly.

The BPMTU provides a turret that is energized with its own rear-mounted power supply (this also helps counterbalance the weight of the gun, mount and shield), a variable turret slew rate, instant rotational change clockwise to counterclockwise and vise versa, and an automatic lock. This is accomplished with no major modifications to the turret or vehicle; we use only existing holes and mounting locations.

The user interface system consists of a joystick control for clockwise and counterclockwise-motorized rotation of the cupola. The system control assembly relays motor operation from the joystick control. The emergency stop switch is the power control switch for the BPMTU system. The break-away connector smoothly detaches the battery charging cable when the cupola is rotated more than 20 degrees.

The motor has an integral brake, which is always on (failsafe mode) except when given a slew command by the operator. The clutch provides a disengagement point in case of motor failure. The complete system does not protrude into the gunner's area thereby providing the maximum amount of room. The variable speed allows target tracking with no distractions and allows the gunner to be able to fire at a moments notice. This method of powering the motor allows continued use throughout a patrol cycle as well as its ability to recharge itself via the vehicles alternator when the engine is running.

This system could be easily adapted to any vehicle sharing the same turret ring as the M1114.

TARDEC observed the need for the motorized turret kit because the turret is very difficult to move when the vehicle is on a 30 percent side slope. For example, without the BPMTU, the manual rotation force needed by the soldier to rotate the cupola is 106 pounds on a 30 percent side slope. With the BPMTU on the same slope, the soldier only needs seven pounds of force to operate the joystick that rotates the turret.

The ease of control and reach for the BPMTU joystick, the emergency stop switch, the motor engagement control lever, and the .50 caliber machine gun were adequate for both the 95th percentile male and the 5th percentile female. When comparing the cupola manual traversing handle and the BPMTU joystick, both the 95th percentile male and the 5th percentile female preferred the joystick over the manual traversing handle because it was much simpler to operate and it required less arm force and less arm movement to traverse the cupola.

Durability testing included 2,000 miles throughout various durability test courses with the cupola being rotated daily to check the wear. The cupola rotation speed in the durability testing scenarios did not vary due to the slope angle.

AMRDEC named R&D Laboratory of the Year

U.S. Army Aviation and Missile Research, Development, and Engineering Center release

The U.S. Army Aviation and Missile Research, Development, and Engineering Center has again won the top Army research and development award in the large development laboratory category.

The Department of the Army Research and Development Laboratory of the Year Awards program is an annual event in which Army laboratories are evaluated on: technical accomplishment and impact on the Army, management accomplishment and benefit to AMRDEC and the Army, and contribution to the Global War on Terrorism and/or Homeland Security.

AMRDEC also received the RDL of the Year Award in 2003 and previously had been awarded the Research and Development Organization of the Year Award in 2000, 1994, 1993, 1989, 1985 and 1981. AMRDEC also has received 16 RDO Excellence Awards between 1976 and 2002.

AMRDEC developed and demonstrated in 2004 the first Close-In Active Protection System for a moving vehicle against rocket-propelled grenades fired from very short range and multiple rocket propelled grenades fired at nearly simultaneous times. The CIAPS radar is fast, accurate, sensitive and robust, and the CIAPS interceptor performance is highly repeatable.

Breakthroughs by AMRDEC in microwave radar hardware architecture, tracking and fire control algorithms, and interceptor lethality optimization have resulted in exceptionally high-threat kill rates. Program Manager Stryker Brigade Combat Team is currently integrating CIAPS onto Stryker BCT for a field demonstration, and CIAPS technology is ready for transition to Future Combat Systems. AMRDEC has significantly improved the Army's ability to protect moving light vehicles from RPG attacks from the minimum arming range and from multiple RPGs fired at nearly simultaneous times. Most importantly, with CIAPS, a solution exists today for protection of our most important national asset -- the American Soldier.

In 2004, AMRDEC completed the first cycle of a novel and innovative software engineering intern program to attract high potential employee candidates and expedite the development of their software engineering skills.

The Federal Career Intern Program was used to accelerate the hiring process, and to attract high potential employees, AMRDEC used its Science and Technology Reinvention Laboratory Personnel Demonstration Program to provide flexibility in establishing starting salaries, offering hiring bonuses to new employees, and rewarding outstanding performance with substantial accelerated salary increases.

In the last three years, AMRDEC has hired the top graduate from the University of Alabama in Huntsville's electrical and computer engineering department. To expedite the development of software engineering skills, AMRDEC interns are given carefully selected laboratory assignments and begin their federal career with attractive integrated work experiences and an on-site classroom instruction program. In the third year of government service, 14 successful interns were awarded a Master of Science in Software Engineering from UAH, and all 14 are currently government employees working in the AMRDEC.

AMRDEC significantly increased aircraft and crew survivability by developing, demonstrating, and deploying multiple quick responses in the Global War on Terrorism. Three examples were highlighted in the oral presentation to the Army Laboratory Assessment Group in August. In the first example, a requirement was identified for increased aircraft awareness during covert night-time operations in the ongoing war effort in Iraq and Afghanistan. In 42 days, AMRDEC

developed, demonstrated, and delivered 250 Apache and 160 Kiowa anti-collision IR strobe kits to the Middle East, providing the required situational awareness.

With the fielding of the anti-collision IR strobe, there have been no mid-air collisions during covert night operations. In the second example, a requirement was identified to improve the ability to provide suppressive fire from rotorcraft. The land-based M240 machine gun had been adapted to provide suppressive fire at each UH-60 [Blackhawk] window and on the Cargo Helicoptor-47 ramp but repeatedly jammed before 20 rounds were fired.

In eight weeks, AMRDEC developed, demonstrated and fielded 840 improved M240 ammunition cans to prevent jamming problems.

Final testing demonstrated 30,000 rounds from a UH-60 and 24,000 rounds from a CH-47 fired without a jam.

In the third example, shortly after a CH-47 was shot down by a Surface- to- Air Missile and 10 days after Dr. Thomas Killion, deputy assistant secretary for Research and Technology, identified AMRDEC as the place where “if anyone can make this work quickly, it is the folks at AMRDEC,” a flare dispense cable was designed, fabricated and fielded for the entire CH-47 fleet. Since the fielding, no CH-47s have been lost to SAMs.

The Research and Development Laboratory of the Year Awards program was established in 1975 to honor Army research and development labs that have made outstanding contributions in science and technology. The Honorable Claude M. Bolton, Jr., assistant secretary of the Army for Acquisition, Logistics and Technology, presented the 2005 award to Dr. William C. McCorkle, director of AMRDEC, during an award ceremony held in Arlington, Va., October 2.

TARDEC provides portable power, Hybrid Humvee receives field testing

By Ashley John
U.S. Tank Automotive Research, Development and Engineering Center

(Sitting in the nucleus of the battalion's tactical operations center synchronizing and coordinating the efforts of the staff during the operation at hand, the Soldier realizes that this isn't just a normal command center. For the first time this operations center is powered by a Hybrid Humvee).

TARDEC, working alongside DRS Technologies, has designed and developed a highly efficient, mobile power source demonstrator – the XM1124 Hybrid Electric Humvee.

The HE Humvee is an advanced series hybrid electric vehicle that houses an engine/generator as the prime power source, a high voltage battery pack for short term load leveling and brake event energy storage, and has the ability to export power. The vehicle demonstrator displays tactical mobility, and in some cases surpasses the standard Humvee. With additional characteristics that reduce fuel consumption, provide for export power, and meet some standard Humvee requirements, the HE Humvee has payoffs that can be attained on current and future military vehicles.

Two of the HE Humvees have recently undergone the first phase of the vehicle's Military Utility Assessments, where Soldiers had the opportunity to perform field assessments on the vehicle's capabilities. During the first assessment at Fort Campbell, Ky., Soldiers drove the vehicle for six miles on battery power, convoyed in the hybrid electric diesel mode, and used the vehicle's electrical system to power a battalion Tactical Operations Center.

The vehicle's Auxiliary Power Distribution System provided auxiliary power to the 1st Battalion, 506th Infantry Regiment, TOC for over 100 hours, showing no signs of apparent power quality issues. The system powered Multi-Band Intra-Team radios, Blue Force Tracker, a computer projector, laptop computers, a map plotter and printer, a coffee pot, and the TOC lighting – all of which were located in the TOC. For the duration of the assessment, Soldiers had the opportunity to evaluate the HE Humvee in the key areas of: mobility in hybrid mode, silent mobility in all-electric mode, portable battery recharging, and silent watch.

"Soldiers have liked the silent watch capability," said Maj. John Williamson of the Soldier Battle Lab in Fort Benning, Ga.

"It allows the Humvee to sit in a battle position at night and operate battery chargers and other devices without the need to periodically run the engine to charge the battery."

The Soldier Battle Lab is conducting the experimentation efforts for the MUA. Several additional capability experiments were performed by the lab during the Soldier Training Exercises. The Soldiers took a look at infrared camera images of the HE Humvee heat signature in power export mode and compared them to the heat signature of a ten kilowatt Tactical Quiet Generator. Evaluations were also made on audible signature of the vehicle in power mode versus the 10 kilowatt TQG audible signature. Results of the MUA are pending the completion of the entire set of assessments and Soldier feedback.

"It's a prototype and has faults," said Staff Sgt. Michelangelo Merksamer, of Headquarters & Headquarters Company, 1/506th Infantry, who assessed the HE Humvee at Fort Campbell.

He further explained that the assessments have been designed to work out the vehicle's flaws, and added that, "it has some application down the road once you work things out."

Further assessments of the HE Humvee will be done. Two of the vehicles will be included in an Air Assault Expeditionary Force MUA that will demonstrate powering another TOC command post, which will be located inside a building. By tapping into the building power mains, the assessment will demonstrate a command post exportable power scenario, convoying in hybrid mode, silent watch and silent mobility, while being able to recharge batteries for the Warfighter.

During the assessments one HE Humvee will be configured with a single APDS, capable of delivering 15 kilowatts of alternating current power. A second HE Humvee will be configured with two APDSs capable of 15 kilowatts each, for a total of 30 kilowatts of non-synchronized (AC) power. The APDS equipped vehicles will provide on board mobile battery charging capabilities, while replacing portable generators, and providing power to Battalion TOCs.

The HE- Humvee is configured as a highly efficient Series-Hybrid that combines a small, lightweight 2.2 liter diesel engine, an advanced lead acid battery system, and a brushless direct current (DC) generator, all of which provide sustaining electric power for the two wheel drive motors. Through the utilization of the vehicle's onboard 75 kilowatt generator, storage batteries, energy management system, and the application of an APDS, the HE- Humvee serves as an uninterruptible and efficient mobile power source. Additional DC power is available to the vehicle occupants while operating on terrain or while the vehicle is stationary, giving the Soldier new options for mission planning and other planning on-the-move operations

Army benefits from hybrid electric power are potentially endless. By applying this type of power source to military vehicles, the Army could have on-board power generating capabilities and will highlight the capacities to recover braking energy, improve fuel economy, reduce emissions, provide silent mobility for increased survivability, and improve Soldier mobility and performance.

Picatinny-developes 105 mm MGS ammo achieves full materiel release

By Jack Crowley
Picatinny Maneuver Ammunition Systems

A Stryker Mobile Gun System fires the new tactical M393A3. Courtesy photo.

Commander of the U.S. Army Joint Munitions Command Brig. Gen. Robert M. Radin recently granted the full materiel release of the 105 mm M393A3 High Explosive Plastic with tracer, known as HEP-T, and the 105 mm M467A1 Target Practice with tracer, known a TP-T.

The approval marked the final programmatic milestone achievement for the Armament Research, Development and Engineering Center's Office for the Project Manager for Maneuver Ammunition Systems and L-3 Communication members of the M393A3/M467A1 integrated product team.

The full materiel release was granted after receiving approvals from Project Manager for Maneuver Ammunition Systems Col. Mark D. Rider, the Armament Research, Development and Engineering Center Material Release Advisory Board Chairman Paul Chiodo and the Program Executive Officer for Ammunition Brig. Gen. Paul S. Izzo this fall.

A 105 mm round leaves a Stryker MGS.

The program was initiated to address a Key Performance Parameter for the Stryker Mobile Gun System. The achievement of materiel release was completed in near record time for a cartridge containing a new dual safe fuze and its associated training round.

The program started at milestone "C" as a Non-Developmental Item (NDI) acquisition. As a result of a competitive shoot-off of Design Evaluation Test samples, L-3 Communication (BT Fuze Division) was chosen as the prime contractor for both low- and full-rate production. Cartridges delivered in fiscal year 2004-2005 for low-rate initial production underwent product verification testing. The M393A3 and the M467A1 trainer were a bundled acquisition throughout the verification stage.

Type Classification-Standard (TC-STD) and a full-rate production decision had been achieved on Aug. 5, 2004. In fiscal year 2005, the program completed all the necessary testing to satisfy all the requirements for a full materiel release.

A 105 mm round from a Stryker MGS hits its target at an Army test range during recent testing.

The HEP cartridge will provide the Stryker Mobile Gun System, known as MGS, with a unique capability to create an opening in double reinforced concrete walls and to defeat enemy bunkers, sniper and machine gun positions with ease, officials said.

The basic 105 mm HEP (M393A2) cartridge was originally type classified in 1964, but because of age and safety and performance considerations, a replacement round was needed. The acquisition program explored other concepts, but none were proven to be better than the improved HEP design.

Some design, and a host of manufacturing, improvements now make the round considerably more accurate and more effective than its predecessor.

As a result of the full materiel release, the MGS will have a new lethal capability unmatched by other direct-fire tank ammunition or existing missiles. The MGS will provide the Army with close-in infantry support unmatched by any vehicle currently fielded.

The MGS will also yield a new anti-personnel capability in the high-performance canister round, the XM1040, designed by an OPM-MAS and ARDEC team.

The target after a 105 mm round from a Stryker MGS hit it.

Picatinny employees help counter IEDs with training solutions

They are known by their acronym – IED [improvised explosive device] and, they are known to be designed to distract, destroy and kill.

One of the most deadly threats the Army faces today is improvised explosive devices, a device placed or fabricated in an improvised manner incorporating destructive, explosive or pyrotechnic chemicals.

Army Lt. Gen. Russell L. Honore, commander of 1st U.S. Army, said, "There is no more important business in 1st Army and to our Army today than to continue to develop, continue to train and continue to evolve techniques to help us fight IEDs."

The mission of the Pyrotechnics Research and Technology Branch, Armament, Research, Developing and Engineering Command is to define current and future threats posed by hostile forces against combat systems and personnel and rapidly develop and deploy pyrotechnics material solutions to simulate battlefield effects to effectively train soldiers and homeland security forces against these threats.

Project Engineers Richard Ames and Jessica Woods, under the direction of their chief James Wejsa, took on this endeavor by evaluating commercial-off-the-shelf solutions, known as COTS, that held the potential to provide more realistic and positive IED training for the Soldiers to improve their combat readiness.

Woods was recognized as the Armaments, Engineering, and Technology Center Employee of the Month for October for her work. She spent multiple days and nights in the field with Soldiers, actively participating in COTS IED capability demonstrations and getting Soldiers' feedback. Her dedicated and personal efforts accelerated the fielding of these critical COTS training devices to the hands of the U.S. warfighters.

Eight COTS training aids were identified as possible solutions for an IED Training Simulator and evaluated for performance and safety. These training aids utilize flash-bang pyrotechnics to simulate an attack.

In October 2003, the Fire Marker Unit, known as FMU, an artillery simulator adapted to simulate small roadside bomb attacks, was urgently safety released to the 7th Army Training Command to train the 1st Infantry Division prior to deployment to Iraq.

In July, a safety confirmation for the FMU and COPAS 1R, a single-shot device ideal for Urban Operations, was signed.

Other urgent safety confirmations and fieldings include the larger Multi-Purpose Pyrotechnic Trainer (MPT-30) for the National Training Center at Fort Irwin, Calif., in August at the request of the NTC Commanding General Brig. Gen. Robert Cone, and the Omega 36 in September for Fort Bliss, Texas.

Both simulate Vehicle Borne IEDs, known as.

The Omega 36 and 60, a larger version of the 36, is now in the process of Type Classification and Material Release. And the MGSS, a 60 -shot launcher, has already completed the Type Classification and Material Release process.

The Self Contained Portable IED Simulator is currently being used at NTC for more advanced insurgency training, and is a prime candidate for a safety confirmation. (By staff of the Pyrotechnic Research and Technology Branch of the Armament Research, Development and Engineering Center.)

Army, Marine Corps transforms multimedia imagery operations

By Desiree DiAngelo
Communications-Electronics Research, Development and Engineering Center Public Affairs Center

It started as a simple suggestion; Marines needed a more effective and efficient multimedia imagery technology; one that was more mobile and scalable than its predecessors.

Marine Lance Cpl. Nathan O. Sotelo checking the TIPS III equipment in Quantico Virginia before deploying the system. (Photo by Marie Moulder)

The transformation of technology and media is imperative, and until now these processing and duplication centers were bulky, unreliable, and unrealistic in the theatre. Next generation technology must posses a quick reaction capability, increased production capacity, and minimal set up, all the while in a consolidated footprint.

However the question remained, what team and what technology could possibly fulfill such a wish list? From that suggestion there spawned a series of discussions, analyses, and even a luncheon chat. Soon after, there were site visits, capability assessments, and a long line of questionnaires.

The solution can be found in the Tactical Imagery Processing System III (TIPS III), a multi functional and multi media system which promises to transform multimedia imagery processing, duplication, and dissemination in support of information operations for the Marine Corps.

With the technology in mind, the team was then chosen. Fort Monmouth, along with the Communications-Electronics Research, Development and Engineering Center's Command and Control Directorate (C2D), were selected to develop the next generation innovative system.

"This organization [CERDEC] had teamwork all the way through to the guy bending the steel, and they are just as committed to the success as I am," remarked Chief Warrant Officer Christopher Cox, the U.S. Marine Corps project office for the system.

The Tactical Imagery Processing System III, is a collaborative effort between the U.S. Army and the U.S. Marine Corps. (Photo taken by Marie Moulder)

TIPS III is the collaborative effort between the United States Army; in specific Fort Monmouth, and the United States Marine Corps. " Here is the Army working with the Marines; a total joint effort to develop a system to be fielded to Iraq to help better serve the war fighter, that is wonderful," remarked Joe Ryan, division chief for C2D.

The product is a state of the art, high volume imaging processing center, allowing media to move quickly through the chain of command. It is one of two programs which comprises the Marine Corps Combat Camera Forces unit; the only division within the military that processes large amounts of media for all branches of the Department of Defense as well as allies.

TIPS III supports the units' mission of providing a tangible means to process and disseminate multimedia for use by both supporting forces as well as Combatant Commanders. It also provides the ability to transmit, store, manipulate, and disseminate all formats of digital media. It is a consolidation of existing systems; a System-Single Point of Service, capable of handling multiple missions; with an emphasis on mobility, self-sustainment, and transportability.

Until now, units relied on centers which either spanned several shelters long or were constructed under make –shift tents. These footprints, along with the technology they housed, were impractical in a tactical environment. The new system is a condensed version of its once bulky TIPS predecessors, with only two shelters and a generator/ECU trailer; and can be up and running within hours. TIPS III has a reduced footprint, improved mobility, organic maintenance capability, and dedicated conditioned power.

C2D engineers at Fort Monmouth busy fabricating TIPS III, the next generation multimedia imagery processing and duplication center. (Photo taken by Marie Moulder)

The system conducts functions at increasingly high speeds, processing 15 hours worth of raw footage within 30 seconds, as well as mass reproduces documents and graphics up to the secret level in nearly half the time it once took. Its digital press capability can produce up to 240 black and white impressions per minute, and 80 colored pages per minute; an asset when performing information, intelligence and reconnaissance operations. Its scalable capabilities can be tailored to meet mission requirements.

In comparison to both the TIPS prototype and TIPS II, this version has endless storage for imagery archiving, can process video duplication in any format or signal, and has full digital video editing capabilities. Included in its efficient editing capabilities, TIPS III can process poster printing, still imagery manipulation, and mass duplication, and can create graphic designs such as logos

It is a self sufficient technology which can solely produce a project from start to finish. Within twelve hours it can generate 1 million booklets; copied, stapled and collated. Prior to this it took a team of soldiers and many hours to put a project of that magnitude together. Now however, the finished product pops right out, with out any handling. “TIPS is unique, there is absolutely nothing like it in the field. Thus far all other attempts have been more like ad-hocs to fix this mission,” added Ryan.

To add to its impressive technological capabilities, TIPS also features state of the art XEROX equipment, which will be integrated into the military line of standard inventory.

“We wanted to give them the latest and the greatest with the project; it was a tremendous undertaking and we are very proud to have had this opportunity Marine Corps,” said Sheryl Berry, business service manager for XEROX.

In the event of a system glitch or a need for an immediate repair, tech support seems a little out of the question when your customers are in the middle of a military environment.

However, for Marines in the field, potential malfunctions are not the end of the world. Instead of sending a XEROX specialist to the scene, for the first time ever Marines will now be specially trained on the commercial equipment, so that they are able to trouble shoot and repair while in the theatre.

“The five week course trained the Marines on how to maintain the equipment. We are very excited and are looking forward to building a pool of trained Marines,” added Berry.

Two Marines, one from the West coast division and the other from the East were chosen to participate in a five week training course given by XEROX specialists. They will in turn teach other Marines as TIPS III is readied for deployment to Iraq.

The prototype for TIPS III; which was completed in September was built at Fort Monmouth, complete with all security accreditation and network architecture. In mid October the keys were then handed over to the Marines, and the system was shipped to Quantico, Va.

In October, the Marine Corps held a VIP day to showcase the finished product. Representatives from the Army, Marines, as well as XEROX were present to see of the system, as it was being readied to be shipped to South Carolina and then deployed to Iraq. “As a whole TIPS III was very well thought out, and its mobility is a significant gain for us,” remarked Lance Cpl. Nathan O. Sotelo; one of the two Marines trained on the system.

From suggestion, to concept, to design, to final product, TIPS III has proven to be a valuable asset to the Marine Corps Combat Camera Forces unit. “This is more capability then we have ever had or seen. The thing that sets this apart from previous centers is that you are putting a fully deployable system, with enormous capabilities right in the hand of the Marines,” concluded Gunnery Sgt. Matthew Smith; Marine project technical lead for TIPS III.

Picatinny dedicates North America's largest nanotechnology laboratory

By Tonya K. Townsell
Picatinny Public Affairs Office

State government officials and representatives from industry joined Picatinny community members in cutting the ribbon for the largest radio-frequency plasma-based nanoparticle reactor in North America recently.

The U.S. Army Armament Research, Development and Engineering Center RF plasma reactor was once something only comprehensible in science-fiction tales.

Now, thanks to partnerships with academia and industry, the possible uses for nanotechnology cover a wide spectrum of needs, ranging from integration into weapon and equipment systems that support Soldiers fighting in the war on terror to health care and cosmetics to electronics and telecommunications.

Picatinny designed, procured and installed the RF plasma reactor and related equipment earlier this year.

Picatinny Directorate of Public Works staff designed the renovation and supervised construction of the remodel, said Chris Berkowitz, the public works director.

Picatinny's Deepak Kapoor (middle), discusses the new Picatinny Induction Plasma Reactor with U.S. Rep. Rodney Frelinghuysen (left) as Armament Research, Development and Engineering Center Director Joseph Lannon (right) looks on after the Dec. 5 ribbon-cutting ceremony for the installations new nanotechnology laboratory. (Photos by Tonya K. Townsell)

Officials said they expect to use this capability to rapidly prototype improved defense systems on behalf of the Department of Defense and its commercial partners.

The reactor is the first of a series of flexible pilot lines Picatinny will establish to create a nanotechnology center. The new pilot facility can produce one kilogram per hour of nanoparticles using a variety of materials.

One use Picatinny's scientists are looking at applying nanotechnology is to improving lethality, said Mark Mezger, Picatinny's nanotechnologies program coordinator and nanotechnology business area manager.

He explained that Picatinny scientists are currently using the technology to try to provide more firepower into the fuse of a 25 mm artillery shell to allow additional room for more lethal components.

Mezger credited U.S. Rep. Rodney Frelinghuysen's support as being significant in providing funding for the reactor.

Frelinghuysen said that although he is a very strong supporter of what nanotechnology and the partnership means to industry and academia, he has a stronger interest in its ability to help America's warfighters on the battlefield.

His primary interest is making sure nanotechnology will protect Soldiers and help in "what I think will be a long war on terror," said Frelinghuysen, who serves on the Defense subcommittee for the House of Representatives Committee on Appropriations.

The production line will help bridge the gap between nano laboratories and the industrial base. It also will accelerate the transition of technology from the laboratory.

Mezger said that the government is taking the lead on sponsoring technology development, which will eventually transition to industry.

He said that because the costs of developing products with advanced nanotechnologies are more than one organization can afford, it is necessary to form public-private partnerships to share the cost and reduce the risks.

"The entire process is accelerated when you can assemble the right organizations to form a complete value chain," he said. "That is organizations with the means to take technology from the laboratory, demonstrate a producible product, and commercialize that product."

Mezger said that the reactor is part of the Nano Valley business model, a project that seeks to generate the partnerships at the beginning of the process.

He explained that industry will benefit considerably more because they will access the technology quicker; and the government will benefit because industry is absorbing some of the costs, while the government can retain the capability for military applications.

State government officials and representatives from industry join Picatinny community members in cutting the ribbon to dedicate North America's largest nanotechnology laboratory Nov. 5.

A number of corporations are presently seeking to develop the economic benefits of nano-enhanced materials rapidly.

The new Picatinny facility serves as a key element in New Jersey's Nanotechnology and Economic Development strategy.

(Editor's note: Picatinny Public Affairs Officer Peter J. Rowland contributed to this article.)

Comment Cards provide "voice" for Soldiers

By Kim Wilson
Research, Development and Engineering Command
Public Communications Office

(Illustration by Jerry Arnold)

The U.S. Army Research, Development and Engineering Command developed a program this past fall to let Warfighters know that their opinions count, by distributing 10,000 comment cards overseas to deployed Soldiers as well as Soldiers state side.

Command Sgt. Maj. Eloy H. Alcivar said that the innovative program launched in November, was developed as a team effort within RDECOM to improve communication between Soldiers in the field and civilian laboratory scientists and engineers who support them. RDECOM has more than 12,000 scientists and engineers working to improve and advance technologies for the Warfighter.

"The comment cards have allowed us to obtain feedback directly from the Soldier, to help scientists and engineers develop and improve current technologies and equipment," Alcivar said.

Sgt. 1st Class, Dion Samuel, Charlie Company, 16th Ordinance Battalion agreed that there is a strong need to "close the loop" of communication between Soldiers and scientists and engineers.

The outcome would be positive if Soldiers knew they had the ability to make change, especially newer Soldiers, Samuel said.

The comment cards target divisions overseas to inquire about specific problems Soldiers may have with equipment, suggestions on methods of improving the equipment, and any further suggestions or issues they would like to add.

After the cards are completed by the Soldiers, they are collected and sent to the Mission Support and Communications Division at RDECOM's System of Systems Integration, Fort Belvoir, Va. for review.

"After reviewing the comments, they are distributed appropriately to the various research, development and engineering centers," Jack Byers, chief of mission support and communications, SOSI, explained. The collected feedback is then placed into a data base so that SOSI can monitor "trends or patterns" that may arise.

Once the comments arrive at the various RDECS, each lab or center will make steps towards developments to satisfy or improve the mobility and survivability of soldiers, Alcivar said.

"When they [scientists and engineers] get feedback from those who are using the equipment, they are getting first hand information," Staff Sgt. Venus Briggs, C Co. 16th Ord. Bn. said. "How else would they [scientists and engineers] know if the equipment is working?"

The concerns Soldiers identified in their feedback covered a wide range, Alcivar said. Soldiers sometimes identify an area that RDECOM does not directly deal with, in those cases SOSI passes the concerns to the correct organization so that all concerns are addressed.

While the comment cards seek to obtain feedback that will help improve Warfighter technologies, Brig. Gen. Mark Brown, Deputy Commanding General, SOSI explained that not all collected feedback is criticism.

“Half of the responses received are telling us positive comments, which is good news for us”, Brown said. “In fact, 20 percent of feedback is asking for more of what they already have,” the general said.

While the Soldiers who fill out the comment cards may remain anonymous, they can request a direct response to their remarks by including their personal contact information. Very few participants required a response, Alcivar recalled, but individuals who requested a reply did receive one.

The responses sent to the Soldiers so far have covered which RDEC their comment was sent to and how RDECOM was to assist with their request.

As a result of the program, awareness of RDECOM has increased among Soldiers.

“RDECOM is not known by many soldiers in the lower ranks,” Alcivar explained. “Now they [Soldiers] can feel like they are a part of the branch and the improvement of new equipment. They now have a voice and have a tool in which they can use to identify their issues.”

The program, deemed successful thus far by Alcivar, will be a continuous one. Plans for distributing 10,000 new and improved comment cards have been initiated. While he described the previous feedback as “sufficient,” more detailed questions would stimulate more production. The new questions cover a wide array of technology topics, and will allow RDECOM to “obtain more specific information to assist Soldiers in providing better quality of feedback.”

RDECOM’s main customer, the Warfighter, is key in the success of the program. We need cooperation and continuous support for the program to assist them and provide better support, Alcivar said.

Soldiers who have questions or comments can contact RDECOM in three ways: by e-mail at techproposals@belvoir.mil, by phone at 703-806-0919, or by mail at Systems of Systems Integration, Chief of Operations, 6000 6th Street, Fort Belvoir, Va. 22060-5608.

TARDEC and Michigan Economic Development Corporation co-sponsor MDIS

U.S. Tank Automotive Research, Development and Engineering Center Communications Team

The U.S. Department of Defense and the State of Michigan welcomed small businesses and private academia to Ann Arbor for the Michigan Defense and Innovation Symposium from Oct.24-25.

The event, co-sponsored by TARDEC and the Michigan Economic Development Corporation, served as a forum to discuss ways the public and private sector can work together to develop military and homeland security capabilities. Michigan Sen. Carl Levin and Gov. Jennifer M. Granholm were on-hand to address the conference attendees and support the technology transfer initiative.

"This conference helps to enhance Michigan's role in the nation's technology innovation engine and highlights the state's ability to contribute to the transformation of our military to meet the threats of the 21st century," said Levin. "By bringing together the cutting-edge innovation community, the systems integrators and DOD officials, we can explore how best to tap Michigan innovation to support the needs of our national defense."

As part of the event, individuals and representatives from private sector organizations had the opportunity to sit down in one-on-one meetings with high-level engineers and program managers from the U.S. Army, Navy, and Air Force, as well as major government contracting firms.

“There is a lot of work being done in small businesses and the academic world that can benefit the programs we are trying to develop within the government,” said Dennis Wend, executive director of TARDEC’s National Automotive Center, the U.S. Army’s link to academia, industry and government agencies in all aspects of automotive technology.

“This conference is a way to help those experts navigate the system and bring their projects to the forefront of the developmental process.”

Smart Galley steams along

Natick Soldier Center Public Release

The second phase of the Smart Galley project, creating a mock galley in the Combat Feeding Navy Lab at the U.S. Army Soldier Systems Center here, has been completed.

Benefits of the automated system were shown during a project review and demonstration in August for members of the Combat Feeding Directorate, the Naval Surface Warfare Center, and Cmdr. Mike Hanson, Naval Supply Systems Command Food Service Director.

The concept of the Smart Galley is to help reduce shipboard labor and to improve quality of life on Navy ships.

“This idea is to combine known technology and new technology to explore an automated approach to galleys,” said Dave Walker of Foster-Miller, who worked with CFD through a Small Business Innovation Research effort to create the mock galley.

As the Navy looks to transform and streamline its operation, ships often have smaller crews. In a sample case presented, about 9 percent of the crew was dedicated to food service.

Many of the tasks performed are very labor-intensive, such as maintenance and repair of appliances, food preparation, and cooking. Smart Galley would reduce the time spent on these tasks and free up the crew for other essential tasks.

The Smart Galley uses off-the-shelf software on a main computer. This main computer would have a layout of the galley on the screen, which would identify the various appliances it’s connected to. Through touch-screens, a Sailor or engineer would be able to control appliances, check maintenance schedules, plan meals, check on problems and more.

The maintenance area is expected to see a significant return on investment with the Smart Galley. Through detailed diagnostics, the Smart Galley will be able to identify not only which appliance is having a problem, but what the problem is. It has an alert system that will notify the operator whether the problem is something as simple as the dishwasher has no soap or if the problem is a more serious system failure. If there is a component failure, a message can be sent not only to the operator, but to the engineering group to let them know about the problem, and this could be tied into a parts list to help with inventory.

According to Ken Ryan, project officer, CFD, this could eliminate the need for a maintenance person going into the galley to check on appliances. In addition, regular maintenance schedules can be programmed into Smart Galley and there will be pop-up screens as reminders that maintenance needs to be or hasn’t been done.

At one point, the demonstration turned into reality. An example had been set for the dishwasher to run remotely. However, due to construction in the building, the diagnostics capability of the mock galley noted that the dishwasher was not at the correct water inlet temperature. The diagnostics capability would not allow the appliance to run until it had reached the correct temperature. Correct temperature is essential for sanitation.

The Smart Galley also can be programmed to evaluate performance of appliances in order to identify degraded performance and predict failure before it happens (a process known as prognostics).

The idea is to have normal operating standards for each appliance and then monitor the actual operations vs. the expected operations.

Rob DiLalla, a mechanical engineer, said the Smart Galley gives operators the chance to measure the performance of their equipment.

Meal planning is another area that could benefit from the Smart Galley.

Sailors will be able to use an automated worksheet, which could pull information such as cooking instructions right from recipes in a database, and once the meal was planned, schedule the appliances with an automated start time. The Smart Galley will automatically check for conflicts and notify the operator if any are found. The operator is always able to change any set point.

The worksheet would be able to calculate portions, and if there was some way to monitor galley choices with an automated user system, such as a smart swipe card, eventually leftovers would be reduced.

The mock galley in CFD is set up with 12 appliances, including combi-oven, convection oven, skittle, griddle, dishwasher and freezer. All the appliances in the mock galley are set up as if they are a true “Smart Galley” and can be monitored off of the main system. Two items, the combi-oven and a convection oven, are set up with supervisory control modules. This gives them dual functions; the operator can set production requirements on the appliances, as well as allowing the system to be controlled remotely.

“The items with supervisory controls can always be controlled manually if necessary and the operators are able to edit any of the pre-set information,” Ryan said.

If the appliance is changed locally, the information is fed back into the main computer and the Smart Galley will adjust based on the new information. During the demonstration, the combi-oven was set for a meal—with start time and temperature—and was remotely started. When it was at the correct pre-heated temperature, an audible alarm sounded indicating it was ready and looking for the oven to be loaded. The rest of the cycle won’t begin until the computer knows that the door has been opened (to load food). At the end of a cycle, it can be programmed to repeat the cycle, hold a cycle, or shut the oven off.

The system can monitor oven temperature to ensure it is correct for food safety. If there’s a problem, not only will it give a visual warning on the screen, but it will sound an audible alarm. For monitoring of food temperature, one idea being looked at is to have a networked hand-held temperature probe hooked up to a personal digital assistant, which can read the information and send it back to the system.

Smart Galley will be compatible with appliances currently on ships. No special wiring would be needed to upgrade the pre-existing systems. Installation on some classes of ships would be a simple retrofit, have a minimal impact, and would turn existing appliances into “smart” appliances. A simple Ethernet would form the network.

Hanson said he sees “a lot of goodness” with the project, and thinks it would be “great” with regard to maintenance monitoring.

In the future he would like to see where they might be able to tie this project into other new technologies, such as RFID, and other smart ideas that the Navy or the Department of Defense may be working.

Gerald Darsch, director of CFD, said that as the Navy transforms for the future, it will want to take the best of all initiatives that are being worked on throughout DOD. He said that aspects of the Smart Galley program could be combined with other ideas, such as passive tagging for inventory management or other supply chain management ideas, to increase total asset visibility. As the CFD conducts a Joint Service Program, interest in this automated system by the other services will be closely watched to ensure joint service interoperability.

According to Ryan, the next steps to be worked on include continued testing in the maintenance area, development of retrofit kits for existing appliances, full system testing at mock galley to show the project is ready for ship use and establishing the cost of a ship demonstration.

For more information about the U.S. Army Soldier Systems Center, please visit our website at: http://www.natick.army.mil.

Wilson Middle School Students tour SSC

The U.S. Army Soldier Systems Center Public Release

The U.S. Army Soldier Systems Center's Women in Science and Engineering Program sponsored an installation tour for the Wilson Middle School this winter.

The middle school students had the opportunity to tour the Climatic Chambers, the Biomechanics Lab, the Fiber Plant, the Parachute Prototype shop, Superheated Liquid Injection Cogeneration Kitchen and various types of shelters as well as a chance to view a Comfort Clothing demonstration, Blown Film Extrusion (nanotechnology), a packaging demonstration, sensory evaluation, microscopy, chemical/biological protective clothing, as well as camouflage and night vision technology.

Kathy Evangelos, program integrator for the Combat Feeding Directorate, has been the main organizer of the tour for the past seven years.

"As scientists and engineers, I believe it's critical to share our knowledge and passion for what we do with students, like those who participated in this year's science and engineering field trip. Having the exposure to world-class, interesting science and technology, is a great thing for these students and I hope it will inspire them to consider going into the fields of science or engineering. The presenters are just great and really capture their interest. I truly enjoy this event each year and continue to receive great feedback from all participants at the SSC and from the students, teachers, and parents," noted Evangelos.

The students were broken up into several groups. Maj. Carlos Correia accompanied one group. While on the Quad, Correia pointed out the various shelters and containerized equipment and noted, "All the equipment you see here is important because it helps Soldiers survive."

Alex Schmidt, a mechanical engineer for the Combat Feeding Directorate, demonstrated the SLICK to students. Schmidt stated, "From my perspective, the reason we invite students to Natick is to expose them to careers in science and engineering. The actual project participants are demonstrating and talking about their in-development equipment. A student might never imagine themselves having such a job--and suddenly it becomes a reality."

For more information about the Soldier Systems Center, please visit our website at: http://www.natick.army.mil .

Accept The Challenge! Volunteer For Ecybermission Today

eCYBERMISSION, a free, web-based science, math and technology competition sponsored by the U.S. Army, needs your help to support America's youth!

Recognizing the decrease in the number of students interested in science, math and technology and the fundamental importance of such disciplines to our global competitiveness and national security, in 2002 the Army created eCYBERMISSION. Originally conceived by former Chief of Staff of the Army, Gen. Eric Shinseki, eCYBERMISSION fosters interest among America's youth in science, math and technology by showing them the everyday applications of these disciplines in their local communities.

The Army challenges students in grades six through nine, while working in small groups of three or four students, to identify a problem in their community and use science, math or technology to develop a solution for it.

"It is remarkable to see the quality of the research being conducted by young students throughout the United States, overseas in our Department of Defense schools and in our territories, said Kelly Stratchko, eCYBERMISSION program manager. "eCYBERMISSION has quickly become an effective curriculum tool for teachers, and a premier motivator for students accepting the Army's challenge."

After completing their research, student teams virtually submit an official write-up, or Mission Folder, of their project through the eCYBERMISSION web site (www.ecybermission.com) and compete both regionally and nationally for recognition and rewards. First place regional winning teams are invited to compete for national honors in Washington, D.C.

In its fourth year, eCYBERMISSION continues to grow and last year had over 1,100 teams submit a Mission Folder for judging.

An essential component to eCYBERMISSION's success is a committed and diverse pool of Army civilian and military volunteers. These volunteers represent the "Face of the Army." There are four types of volunteers:

- **Ambassadors** reach out to the local community to encourage students and teachers to join eCYBERMISSION
- **Installation Points of Contacts (POC)** coordinate Ambassador activities at their respective installations
- **CyberGuides** serve as on-line mentors to eCYBERMISSION teams
- **Virtual Judges** independently evaluate and score on-line team entries

"It is even more important today that our Soldiers and civil service personnel step in and volunteer their valuable time in helping our nation's youth get excited about science, math and technology," said Tom Moyer, eCYBERMISSION spokesperson.

"The program's success is directly attributable to the significant contributions of selfless volunteers who want to make a true difference in a student's life."

To become an Ambassador, Installation POC, or CyberGuide, one must have an active security clearance and supervisor approval. To volunteer as a Virtual Judge, one does not need an active security clearance but must have a background related to science, math or technology.

If you would like to volunteer with eCYBERMISSION or know of students who could benefit from participating in the competition, please visit www.ecybermission.com or contact the Volunteer Program directly by phone at 1-866-GoCyber (1-866-462-9237) or by e-mail at volunteerprogram@ecybermission.com.

Natick's caffeine gum now in Army supply channels

By Karen Fleming-Michael
U.S. Army Medical Research and Materiel Command

The Army recently finished testing the Natick Soldier Center's "Stay Alert" caffeine gum as a countermeasure for fatigue and the new product is now available through military supply channels.

The Walter Reed Army Institute of Research, known as WRAIR, tested the new gum in its Silver Spring, Md., facilities.

"We wanted to show that the gum is a quick and safe method of maintaining or improving alertness and physical and mental performance, and our tests did that," said Dr. Gary Kamimori of the Department of Behavioral Biology at WRAIR.

Members of the Victory detachment of the Rapid Equipping Force-Iraq, try Stay Alert chewing gum Jan. 13. Each piece of the gum contains 100 mg of caffeine, which is about the amount found in a six-ounce cup of coffee. (Photo by Capt. Patrick McNutt)

Gum 5 times faster than coffee

Each piece of Stay Alert chewing gum contains 100 mg of caffeine, which is about the amount found in a six-ounce cup of coffee.

"Because it's chewed, it delivers caffeine to the body four to five times faster than a liquid or pill because it's absorbed through tissues in the mouth -- not the gut, like in traditional formulations," Kamimori said.

A sleep researcher, he learned of the idea of delivering caffeine through gum in 1998. Congress funded the first study on the gum a year later.

When the study validated how fast the caffeine was absorbed in the body, the U.S. Army Medical Research and Materiel Command, the parent command of WRAIR, began developing and testing Stay Alert for use in sustained or continuous military operations when Soldiers typically don't get enough sleep.

Study finds caffeine safe

A report from the Committee on Military Nutrition Research of the National Academy of Sciences on "Caffeine for the sustainment of mental task performance" published in 2001 also lent more support for the product. Included in the report was a review of the detrimental effects of sleep restriction and sleep deprivation on mental and physical performance.

The report concluded that caffeine was safe and effective and supported developing the caffeinated chewing gum.

Kamimori's staff has validated the gum's physiological effects in both single and multiple doses. The staff was also able to determine the best dosing regimens for Soldiers who, because of their mission, aren't able to go to sleep.

Stay Alert Gum (Photo by Dustin Perry)

"We've also evaluated the effects of habitual use of the gum and determined the effects of caffeine administration on the subsequent ability to sleep in Soldiers who were kept awake for 36 to 77 hours straight," Kamimori said. "They were able to sleep just as well as the groups that received placebos."

Gum keeps troops alert

WRAIR researchers have also conducted studies with colleagues from Defence Research and Development Canada–Toronto and the New Zealand Defense Forces, with promising results, Kamimori said.

"In three studies, using multiple administrations of caffeine with Stay Alert gum, they (Soldiers) reported that alertness, marksmanship -- both simulated and live fire -- vigilance on observation and reconnaissance tasks and physical performance during simulated operations were either maintained or improved as compared to those Soldiers who received a placebo chewing gum," he said.

Gum part of SOF rations

The Department of Defense Combat Feeding Program of the Natick Soldier Center tested and approved the gum to become a component of the experimental "First Strike Ration." The lightweight ration is designed for Special Operations Forces.

Three hundred cases of the Stay Alert gum went to Soldiers in the field in 2004.

"What we've heard from troops using the product both in the U.S. and in the Middle East has been positive," Kamimori said.

Stay Alert has a National Stock Number (NSN #8925-01-530-1219) and is available to all military personnel.

ARDEC's new director opens doors for first town hall

By Diane Alario
U.S. Army Armament Research, Development and Engineering Center

The director of the Armament Research, Development and Engineering Center began his town-hall series with a central theme of "communication is very important" in the Lindner Conference Center Nov. 18.

During the series, which ran through Nov. 30, Joseph Lannon encouraged the concept of a boundaryless organization with open lines of communication, the sharing of knowledge, ideas, and expertise as his vision for ARDEC.

"Open communication within our organization is critical to our success and I encourage a culture within our workforce where all of your great ideas can be heard and shared," he said.

"This is important to the success of each individual member of our workforce and to the organization as a whole," he said adding that "Our workforce and their knowledge and expertise are the cornerstones of our organization."

ARDEC Director Joseph Lannon discusses the Talon robot (background) during his town-hall series. (Photo by Todd Mozes)

During the series, Lannon said he wanted to focus on information he believes is significant to ARDEC's future. He said he also wanted to give ARDEC members the opportunity to ask questions about topics that are important to them.

To emphasize his concept of sharing and that ARDEC must remain entrepreneurial and constantly innovating, he said he plans to highlight an ARDEC technology during each of his town halls.

For this quarter he chose to spotlight the Talon robot. As part of this discussion, the Explosive Ordnance Disposal Technology Team conducted a demonstration with the robot. The Talon SWORDS robot was selected by Time magazine as one of "The Most Amazing Inventions of 2004."

Following the Talon demonstration, Lannon shared his beliefs on customer service. He said that the ARDEC culture must be open to customers whose voices and views are the best guides to product development.

Of his beliefs on customer service, Lannon said that the "customer/warfighter is always right."

Outlining his short-term objectives and long-term emphasis for ARDEC, Lannon discussed the enterprise's critical need to upgrade facilities and equipment, the organizational value derived from an increased use of modeling and simulation and the implementation of a universal approach to systems engineering.

Equally important, he said, is the learning and growth of ARDEC people, critical components in the quest to retain a competitive advantage.

At the end of the event Lannon asked the ARDEC workforce for assistance in a few areas, including supporting the continuous improvement of the organization, specifically by embracing its future direction with the implementation of the National Security Personnel System.

Lannon's next town-hall series is scheduled for mid-January through mid-February.

(Editor's note: Diane Alario works in the ARDEC Strategic Management Office.)

TARDEC-Groves robotic alliance comes up short at Kettering University kickoff

By Jack Jones
U.S. Tank Automotive Research, Development and Engineering Center

The Kettering Kickoff signals the start of the high school competitive robotics season, which begins January. Thousands of students, teachers, parents, and industry engineers combined forces to build and compete in robotic games.

Thirty high school robotics teams flocked to Flint, Mich., home of Kettering University, from as far away as New Jersey to give students a chance to get fired up about the 2006 season, and to give their 2005 robot one last run.

Coming up on the short end of the referees' count after the quarterfinal match at the kickoff competition, the TARDEC-Groves team stole the show by taking away the Top Score of the Day Award. This fierce team didn't stop there; they also took away the Innovation in Control Award, which recognizes an innovative control system or application of control components to provide unique machine functions, particularly in autonomous control mode.

While many other robots were leaving parts on the field, TARDEC-Groves left nothing but skid marks. Wins and losses in FIRST depend a great deal on the luck of the draw. The Groves students and teachers, and TARDEC engineers set out in January 2005 to build a "bulletproof" robot and let luck run its course.

The robot has won four competitions, with 54 matches under its belt. Its only malfunction was one cracked weld that did not come loose.